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Analysis of the performance test results of young pure breed boars from the Bydgoszcz breeding region in Poland

Analiza wyników oceny przyżyciowej knurków czysto rasowych pochodzących z bydgoskiego okręgu hodowlanego w Polsce

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Abstract

The aim of presented paper was analysis of the performance test results of young pure breed boars coming from The Bydgoszcz Breeding Region (located in Poland in Kujawy-Pomorze Province). The research covered the results concerning 4190 young boars of following breeds: Polish Large White, Polish Landrace, Hampshire, Duroc and Pietrain. Young pure breed boars were performance tested in 2009 and 2010 in The Bydgoszcz Breeding Region according to the actual methodology. Among young pure breed boars performance tested in The Bydgoszcz Breeding Region in tested years animals of Hampshire breed had the higher growth rate. The pigs of Pietrain breed had the highest meat content. Regarding to the most important parameter of performance test, i.e. selection index in analyzed years 2009 and 2010 the best results had young boars of Hampshire then Pietrain, Duroc, PLW and PL.

Keywords: daily gain of body weight, meat content, performance test, selection index, young pure breed boars

Abstrakt

Celem prezentowanej pracy była analiza wyników oceny przyżyciowej knurków czysto rasowych pochodzących z bydgoskiego okręgu hodowlanego (zlokalizowanego w Polsce, w woj. kujawsko-pomorskim). Badaniami objęto wyniki dotyczące 4190 knurków ras: wielkiej białej polskiej, polskiej białej zwisłouchej, hampshire, duroc i pietrain. Knurki zostały poddane ocenie przyżyciowej w 2009 i 2010 r. w bydgoskim okręgu hodowlanym według aktualnej metodyki. Spośród knurków czysto rasowych ocenionych przyżyciowo w bydgoskim okręgu hodowlanym w badanych latach zwierzęta rasy hampshire odznaczały się największym tempem wzrostu. Świnie rasy pietrain charakteryzowały się największą mięsnością. Pod względem najważniejszego parametru oceny przyżyciowej, tj. indeksu selekcyjnego w analizowanych latach 2009 i 2010 najlepsze wyniki uzyskały knurki rasy hampshire, następnie pietrain, duroc, wbp i pbz.

Słowa kluczowe: indeks selekcyjny, knurki czysto rasowe, mięsność, ocena przyżyciowa, przyrost dobowy masy ciała

Streszczenie szczegółowe

Znaczący postęp wartości hodowlanej trzody chlewnej w zakresie użytkowości tucznej i rzeźnej nastąpił na skutek prac hodowlanych prowadzonych na podstawie oceny przyżyciowej. Wyniki tej oceny są jednym z podstawowych kryteriów w pracach selekcyjnych nad trzodą chlewną przy wyborze zwierząt do stad hodowlanych i produkcyjnych. Bydgoski okręg hodowlany zlokalizowany jest w woj. kujawsko-pomorskim i w produkcji świń zajmuje czołowe miejsce w Polsce, a produkowane na jego terenie knurki i loszki oddziałują na poziom użytkowości tego gatunku zwierząt w kraju. Celem pracy była analiza wyników oceny przyżyciowej knurków czysto rasowych przeprowadzonej w latach 2009 i 2010, pochodzących z Polski, z bydgoskiego okręgu hodowlanego. Analizą statystyczną objęto wyniki oceny 4190 knurków: wielkiej białej polskiej (wbp), polskiej białej zwisłouchej (pbz), hampshire, duroc i pietrain. Knurki zostały poddane ocenie przyżyciowej w 2009 i 2010 roku w bydgoskim okręgu hodowlanym według aktualnej, zmodyfikowanej metodyki, która przy obliczaniu indeksu selekcyjnego uwzględnia przyrost dobowy masy ciała oraz procentową zawartość mięsa w ciele, standaryzowaną na 180. dzień. Statystyczne opracowanie wyników przeprowadzono stosując jednoczynnikową analizę wariancji ANOVA. Posługiwano się programem komputerowym Statistica 8.0 PL. Przyrost dobowy masy ciała standaryzowany na 180. dzień życia knurków pochodzących ze wszystkich badanych grup wynosił średnio w 2009 r. 703 g a w 2010 r. 684 g. Największym tempem wzrostu w obu badanych latach, tj. w 2009 i 2010 odznaczały się świnie hampshire (odpowiednio 787 i 809 g) oraz duroc (odpowiednio 764 i 731 g). Różnice pomiędzy tymi grupami zwierząt a osobnikami ras wbp, pbz i pietrain były statystycznie wysoko istotne i istotne. Różnice w przyroście dobowym masy ciała w 2009 roku pomiędzy najlepszą grupą, tj. hampshire a pozostałymi badanymi rasami zwierząt wynosiły odpowiednio (w g): 23 (duroc), 80 (wbp), 91 (pbz) i 92 (pietrain), natomiast w 2010 roku między tą samą rasą świń, czyli hampshire a innymi grupami zwierząt kształtowały się w sposób następujący: 78 (duroc), 115 (wbp), 134 (pbz), 139 (pietrain) i okazały się statystycznie wysoko istotne. Średnia mięsność, czyli zawartość mięsa w ciele wszystkich knurków czysto rasowych ocenionych przyżyciowo w bydgoskim okręgu hodowlanym w 2009 roku wynosiła 59,6% a w 2010 r. była wyższa o 0,4% i kształtowała się na poziomie 60,0%. Największą standaryzowaną zawartością mięsa w ciele w obu analizowanych latach charakteryzowały się zwierzęta rasy pietrain - 63,1%. Następne w kolejności były knurki ras hampshire i duroc oraz wbp i pbz. Różnice pomiędzy świniami rasy pietrain a knurkami pozostałych grup okazały się statystycznie wysoko istotne. Najważniejszym parametrem oceny przyżyciowej świń jest indeks selekcyjny określający użytkowość własną zwierząt. Średnia wartość indeksu selekcyjnego wszystkich badanych knurków w 2009 r. kształtowała się na poziomie 114 pkt., natomiast w 2010 r. wynosiła 113 pkt., a więc nieznacznie obniżyła się (o 1,0 pkt.). Najwyższą jego wartością odznaczały się zwierzęta hampshire, w 2009 r - 128 pkt. i w 2010 r. - 129 pkt., a różnice pomiędzy tą grupą zwierząt a pozostałymi zostały potwierdzone na poziomie istotności P≤0,01. Następne w kolejności pod względem wartości indeksu selekcyjnego w badanych latach, tj. 2009 i 2010 były knurki pietrain (121 pkt. i 118 pkt.), duroc (119 pkt. i 117

pkt.), wbp (116 pkt. i 115 pkt.) oraz pbz (112 pkt. i 111 pkt.). Różnice dotyczące indeksu selekcyjnego wyrażone w punktach w 2009 roku między najlepszą 3 grupą, tj. hampshire a pozostałymi rasami świń wynosiły od 7,0 (pietrain, grupa 5) do 16,0 (pbz, grupa 2), również w 2010 roku wystąpiły podobne tendencje, gdyż różnice pomiędzy knurkami hampshire a innymi grupami zwierząt wynosiły od 11,0 (pietrain, grupa 5) do 18,0 (pbz, grupa 2). Porównując wyniki z 2009 i 2010 r. można stwierdzić, że indeks selekcyjny u świń rasy pietrain zmniejszył się o 3,0 pkt. W przypadku knurków wbp, pbz i duroc zmniejszył się także, ale w mniejszym stopniu, gdyż tylko o 1,0; 1,0 i 2,0 pkt. Jedynie u zwierząt rasy hampshire zwiększył się o 1,0 pkt.

Introduction

Significant progress of the breeding value of pigs in the range of fattening and slaughter performance occurred as a result of breeding work carried out on the basis of the performance test (Różycki 1999, 2003, 2004). The results of this evaluation are one of the main criteria in the selection work over the pigs in the selection of animals for breeding and producing herds (Buczyński et al. 1999, Grudniewska 1998, Milewska and Eljasiak 1997, Różycki 1998, 1999). Performance test has a unique role in the conducted selection, especially male individuals, because from their breeding value depends largely on the productivity of breeding and mass livestock. Therefore a comparative tests are needed that seeks to know the characteristics of each breed young boars and lines of pigs and their crosses variants (Buczyński et al. 1999, Czarnecki 1999 a, b, Eckert and Szyndler-Nędza 2010, 2011, Michalska 1996, Michalska and Nowachowicz 2000, 2002, Michalska et al. 1998, 2000, Różycki 1995, Różycki et al. 1980, 1986).

Performance test in Poland, including The Bydgoszcz Breeding Region, covers nowadays young boars of following pure breeds: Polish Large White, Polish Landrace, Hampshire, Duroc, Pietrain, synthetic Line 990 and young two-breed crossbred boars resultant from their reciprocal crossing (Eckert and Szyndler-Nędza 2010, 2011).

The Bydgoszcz Breeding Region is located in Kujawy-Pomorze Province and has a leading position in pig production in Poland and produced there young boars and gilts impacts on the utility level of these animals in the country. The results of performance test of pigs breed in the country and the particular regions of Poland are diversed and changes in following years of conducting the performance test, therefore they should be monitored (Buczyński et al. 1999, 2001, Czarnecki et al. 1999 a b, Eckert and Szyndler-Nędza 2010, 2011, Fandrejewski et al. 2001, Michalska 1996, Michalska and Nowachowicz 2000, 2002, Michalska et al. 2000, 2004, 2006 a, b, 2010, Milewska and Falkowski 2001, Różycki 1999, 2003, 2004).

The modification of the performance test of farm animals was introduced from 1st October 2004 to increase the accuracy of assessment and resulted from the need to take into account the current value of the genetic population of pigs in our country (Eckert and Szyndler-Nędza 2010, 2011). It consisted of the introduction of new models and equations to standardize daily gain and assessing the percentage of meat in the body of pigs. Also were introduced the standardized backfat thickness measurements and height of the loin eye to a constant weight – 110 kg and standardization of the equation that estimates the percentage of meat in the body to a constant age - 180 day of animals life (Szyndler-Nędza et al. 2010 a). Since the introduction of modified performance test definitely changed the breeding pig

population in our country. Therefore, the authorities of The Polish Association of Breeders and Producers of Pigs "POLSUS" decided to venture steps to verify that introduced in 2004 to standardize the measurement performance test models work properly. For this purpose, in agreement with the Institute of Animal Production, was developed a testing methodology of young boars and gilts in breeding farms. The additional evaluation will cover young boars and gilts from selected herds of following breeds: PLW, PL, Duroc and Pietrain from about 140 to 210 days of age.

The aim of the present study was to analyze the results of performance test of the pure breed young boars carried out between 2009 and 2010, from Poland, from The Bydgoszcz Breeding Region.

Materials and Methods

The statistical analysis covered the results of 4190 young pure breed boars of Polish Large White (PLW), Polish Landrace (PL), Hampshire, Duroc and Pietrain. Young boars were performance tested in year 2009 and 2010 in The Bydgoszcz Breeding Region covered Kujawy-Pomorze Province with accordance to actual, modified methodology that to the calculation of the selection index includes daily weight gain standardized on 180th day and the percentage body meat content (Eckert and Szyndler-Nędza 2011).

Backfat thickness measurements in P_2 and P_4 points and the height of loin eye in P_4 point were made by ultrasonic apparatus PIGLOG 105 on a live animal. In order to increase the accuracy of the evaluation and elimination of differences resulting from the measurements on animals at different their body weight, standardization of fat thickness and loin eye height to body weight of 110 kg is made. Standardization of particular measurements was made according to the obligatory formulas (Eckert and Szyndler-Nędza 2011):

$$P_{2st} = \frac{15.15084P_2}{0.112345Z + 2.79289}$$

$$P_{4st} = \frac{14.32432P_4}{0.100311Z + 3.29011}$$

$$P_4M_{st} = \frac{47.556226P_4M}{0.1392866Z + 32.2347}$$

where:
P_{2st} - backfat thickness measured in P_2 point standardized on 110 kg of body weight,
P_{4st} - backfat thickness measured in P_4 point standardized on 110 kg of body weight,
P_4M_{st} – height of loin eye standardized on 110 kg of body weight,
Z – body weight on the test day.

Backfat thickness measurements in P_2 and P_4 points and the height of loin eye in P_4 point were made on the right side of the animal.

On the base of standardized backfat thickness and loin muscle measurements percentage body meat content was calculated according to the formula:

$$M_B(\%) = -0.4776P_{2st} - 0.4593P_{4st} + 0.3486P_4M_{st} + 48.9829$$

In order to eliminate the differences caused by evaluation the animals of different age percentage body meat content was standardized at the age of 180 days according to the formula (Eckert and Szyndler-Nędza 2011):

$$X_2 = \frac{53.564\ M}{-0.0004W^2 + 0.0621W + 55.346}$$

where:
X_2 – percentage body meat content standardized on 180 days of life,
M – percentage meat content, estimated on the test day on the base of backfat thickness and loin eye measurements standardized on 110 kg of body weight (M_B lub M_P),
W – age of animal on the test day.

Standardized daily gain of body weight and standardized percentage body meat content are the base for estimation of the selection index that is the end result of performance test.
The formulas of performance test selection indices were as follows (Eckert and Szyndler-Nędza 2011):

for maternal lines: $I_M = 0.1556X_1 + 3.1023X_2 – 179.4935$
for paternal lines: $I_O = 0.1364\ X_1 + 4.7820X_2 – 275.5944$

where:
X_1 – daily gain standardized on 180 days of life,
X_2 – percentage meat content estimated on the basis of standardized measurements of backfat thickness and muscle to 110 kg, then standardized on 180th day of life.

The results were statistically elaborated using one-way variance analysis ANOVA. Computer program Statistica 8.0 PL (2008) was used.

Results and Discussion

Tables 1 and 2 give the number of young pure breed boars in 5 tested groups and present the results of performance test including growth and slaughter traits and the selection index value.

Table 1. The results of performance test of pure breed young boars in year 2009
Tabela 1. Wyniki oceny przyżyciowej knurków czysto rasowych w 2009 roku

Trait		Group					Total	Significance of differences	
		PLW 1	PL 2	Hampshire 3	Duroc 4	Pietrain 5		P≤0.01	P≤0.05
Number (pcs.)		689	1676	17	131	145	2658		
Age on test day (days)	$\bar{x}$	178	173	173	173	180	175	-	5-2,3,4
	s	15	14	16	18	18	15		
Body weight on test day (kg)	$\bar{x}$	122.9	116.4	135.2	127.2	122.9	119.1	1-2,3; 2-3,4,5	-
	s	12.9	12.8	10.9	11.48	17.18	13.6	3-4,5	
Daily gain of body weight standardized on 180th day (g)	$\bar{x}$	707	696	787	764	695	703	1,2,5-3,4	-
	s	120	108	74	116	124	113		
Standardized backfat thickness in P_2 point (mm)	$\bar{x}$	9.00	9.39	7.34	8.18	7.50	9.12	1,2-3,4,5	4-3,5
	s	1.86	1.84	1.20	1.71	1.77	1.90		
Standardized backfat thickness in P_4 point (mm)	$\bar{x}$	8.85	9.36	7.82	8.46	7.72	9.09	1-3,5; 2-3,4,5	4-3,5
	s	1.74	1.65	0.56	1.53	1.64	1.72		
Standardized height of loin eye (mm)	$\bar{x}$	55.0	56.0	57.8	57.0	59.1	56.0	1-3,4,5; 2-3,5	-
	s	3.9	3.9	2.5	4.4	4.94	4.1	4-5	
Standardized body meat content (%)	$\bar{x}$	59.7	59.2	61.6	60.6	63.1	59.6	1,2-3,4,5;	-
	s	1.9	1.8	1.1	1.9	1.8	2.1	3-4,5 4-5	
Performance test selection index (points)	$\bar{x}$	116	112	128	119	121	114	3-1,2,4	5-2,3
	s	21	19	8	16	15	19		

Table 2. The results of performance test of pure breed young boars in year 2010
Tabela 2. Wyniki oceny przyżyciowej knurków czysto rasowych w 2010 roku

Trait		Group					Total	Significance of differences	
		PLW 1	PL 2	Hampshire 3	Duroc 4	Pietrain 5		P≤0.01	P≤0.05
Number (pcs.)		595	1429	20	126	82	2252		
Age on test day (days)	$\bar{x}$	179	178	159	173	181	178	3-1,2,4,5; 4-5	4-1,2
	s	14	15	5	16	17	15		
Body weight on test day (kg)	$\bar{x}$	122.1	118.1	120.0	121.6	119.0	119.4	-	-
	s	11.3	11.8	6.1	11.8	10.7	11.7		
Daily gain of body weight standardized on 180th day (g)	$\bar{x}$	694	675	809	731	670	684	3-1,2,4,5; 4-2,5	1-4
	s	90	95	41	108	101	96		
Standardized backfat thickness in P_2 point (mm)	$\bar{x}$	8.98	9.31	7.32	7.77	7.58	9.06	1,2-3,4,5	-
	s	2.16	1.93	0.88	1.63	2.27	2.04		
Standardized backfat thickness in P_4 point (mm)	$\bar{x}$	9.19	9.47	8.44	8.36	7.82	9.26	1,2-3,4,5	3-5
	s	1.77	1.69	0.97	1.39	2.04	1.75		
Standardized height of loin eye (mm)	$\bar{x}$	56.0	56.3	62.2	58.3	59.8	56.5	1,2-3,4,5	4-5
	s	4.2	4.3	1.3	4.7	6.6	4.5	3-4,5	
Standardized body meat content (%)	$\bar{x}$	60.0	59.7	61.5	61.2	63.1	60.0	1,2-3,4,5	-
	s	2.0	2.0	0.7	1.9	1.9	2.1	5-3,4	
Performance test selection index (points)	$\bar{x}$	115	111	129	117	118	113	3-1,2,4,5	2-4,5
	s	17	17	7	18	12	17		

Among young boars performance tested in The Bydgoszcz Breeding Region the most numerous were animals of Polish Landrace breed (in 2009 - 1676 pcs., in 2010 - 1429 pcs.), then Polish Large White (in 2009 - 689 pcs. and in 2010 - 595 pcs.). Among the remaining breeds, used as paternal components, the most numerous in 2009 were young boars of Pietrain breed (145 pcs.) and in 2010 – Duroc individuals (126 pcs.), then animals of Duroc breed tested in 2009 – 131 pcs. and in 2010 – Pietrain pigs (82 pcs.). The least numerous group in analyzed years, thus 2009 and 2010 were young boars of Hampshire breed, 17 and 20 pcs., respectively.

The youngest on the performance test day in 2009 were young boars from PL, Hampshire and Duroc breed (173 days). The oldest were animals of Pietrain breed (180 days) and the differences between them and the remaining groups, except PLW were statistically significant. Similarly in 2010 Hampshire pigs were the youngest (159 days) - $P \leq 0.01$ and young boars of Pietrain breed (181 days) were the oldest on the performance test day and the differences between them and the remaining groups of animals were verified as statistically high significant and significant (Tables 1 and 2). The highest body weight on the performance test day in 2009 had Hampshire young boars – 135 kg, then Duroc, PLW and Pietrain, the lowest had pigs of PL breed (116 kg). Between the Hampshire animals and the pigs from remaining groups in range of this trait statistically high significant differences occurred. In 2010 the order of young boars in range of above mentioned trait was another and shaped as follows: PLW and Duroc (122 kg), Hampshire (120 kg), Pietrain (119 kg) and PL (118 kg). However, the differences of body weight between particular groups were not as high as in 2009 and were not statistically confirmed.

Daily gain of body weight standardized on 180th day of life of young pure breed boars of all tested groups amounted in 2009 - 703 g and in 2010 – 684 g, averagely. The highest growth rate in both tested years i.e. in 2009 and 2010 had Hampshire pigs (787 and 809 g, respectively) and Duroc (764 and 731 g, respectively). The differences between these groups of animals and PLW, PL and Pietrain individuals were statistically high significant and significant – Tables 1 and 2. The differences in daily gain of body weight in 2009 between the best group – Hampshire and the remaining tested groups of animals were (in g): 23 (Duroc), 80 (PLW), 91 (PL) and 92 (Pietrain), respectively. However, in 2010 between the same pigs breed (Hampshire) and other groups of animals shaped as follows: 78 (Duroc), 115 (PLW), 134 (PL), 139 (Pietrain) and were statistically high significant. In the previous research of Michalska et al. (1998, 2000, 2010), Milewska and Falkowski (2001) and Milewska and Grudniewska (1999) also higher growth rate of young boars of Duroc breed as compared to the others performance tested breeds of pigs was noticed. In presented research the results of other authors were confirmed, which observed that the daily gain of body weight of pigs of Pietrain breed was lower as compared to the other breeds of pigs (Czarnecki et al. 1999 a, b, Eckert and Szyndler-Nędza 2010, 2011, Michalska et al. 1998, Różycki 1997).

It should be recognized, that in young boars performance tested in The Bydgoszcz Breeding Region in year 2009 the growth rate of pure breed pigs (except PLW and PL) was higher from animals tested in the whole country and the differences expressed in grams amounted 65 (Hampshire), 54 (Duroc) and 15 (Pietrain), respectively (Eckert and Szyndler-Nędza 2010). Analyzing the results obtained from young boars tested in The Bydgoszcz Breeding Region in 2010 it should be stated, that the daily gain of body weight of PLW, Hampshire, Duroc and Pietrain animals

was higher by 5, 128, 41 and 16 g, but PL pigs lower by 15 g from the country average value (Eckert and Szyndler-Nędza 2011).

Standardized backfat thickness in P_2 and P_4 points of all young boars performance tested in The Bydgoszcz Breeding Region in year 2009 shaped at the similar level and amounted 9.1 and 9.1 mm, respectively (Tables 1 and 2). In year 2010 the similar results were 9.1 and 9.3 mm. The most favourable results of standardized backfat thickness in P_2 and P_4 points in analyzed years had young boars of Hampshire, Pietrain and Duroc breeds and the differences between them and young boars of PLW and PL breeds were generally statistically high significant. Regarding to the average results of all young pure breed boars performance tested in Poland in 2009 and 2010 it may be noticed that the thinnest backfat had young boars of Pietrain breed (Eckert and Szyndler-Nędza 2010, 2011).

The standardized height of loin eye of all tested young boars measured in P_4 point (Tables 1 and 2) regarding to the results in tested years (2009 and 2010) was on average 56.0 and 56.5 mm, respectively. The most favourable the height of loin eye measured in P_4 point shaped in Pietrain boars (59.1 mm) performance tested in 2009 but in 2010 in Hampshire animals (62.2 mm, $P \leq 0.01$). The lowest height of loin eye in analyzed years (2009 and 2010) had young boars of PLW breed (55.0 and 56.0, respectively) and the differences between this group and the young boars of Pietrain, Hampshire and Duroc breed were statistically high significant.

The height of loin eye of young boars performance tested in The Bydgoszcz Breeding Region in 2009 comparing to the country results was higher in Duroc pigs but lower in PLW, PL, Hampshire and Pietrain (Eckert and Szyndler-Nędza 2010). In 2010 in pigs performance tested in The Bydgoszcz Breeding Region regarding to the average value of pigs in Poland in range of the analyzed trait the more favourable result was observed in young boars of Hampshire and Duroc breed close to PL and Pietrain and the same as in PLW animals (Eckert and Szyndler-Nędza 2011).

The average meat content, thus the body meat content of all pure breed young boars performance tested in The Bydgoszcz Breeding Region in 2009 amounted 59.6% and in 2010 was higher by 0.4% and shaped at the level of 60.0%. The highest standardized body meat content in both analyzed years had animals of Pietrain breed – 63.1%. The next were young boars of Hampshire and Duroc breed and PLW and PL breed. The differences between the pigs of Pietrain breed and the young boars of the remaining groups were statistically high significant. In another studies (Czarnecki et al. 1999 a, Michalska et al. 2004, 2006 b, 2010, Rak et al. 1993) pigs of Pietrain breed had higher meat content as compared to the animals of tested breeds. The Pietrain animals due to their outstanding meat content are used in crossing programs in many European countries (Arent et al. 1988, Czarnecki et al. 1999 a, b, Michalska et al. 1998, Milewska and Falkowski 2001, Rak et al. 1993).

Young boars performance tested in The Bydgoszcz Breeding Region in 2009 had a slightly worse body meat content in the PLW and PL breeds comparing to the average value in the whole country, however a slightly better in Hampshire, Duroc and Pietrain animals (Eckert and Szyndler-Nędza 2010). In 2010 it was observed that the value of tested trait in the young boars performance tested in the Bydgoszcz region towards the country results was higher in Duroc, slightly better in PLW and PL pigs and a slightly lower in Hampshire and Pietrain animals (Eckert and Szyndler-Nędza 2011).

It is worth noticing that one of the most important characteristics of each quantitative trait, and thus also the characteristics taken into account in the performance test is heritability (Różycki 1998). Indicator of heritability (h^2) is used to predict reliable assessment of breeding (genetic) value on the basis of phenotypic value. Traits of a low heritability are difficult to improve by selection. The highest h^2 have the traits that from a biological point of view are less important in realizing reproductive function, eg. meat traits. Różycki (1998) on the base of research of other authors gives heritability indicators of some performance traits of pigs, eg. daily gain of body weight, average backfat thickness from 5 measurements and percentage meat content in primary cuts, which were 0.30; 0.45 and 0.46, respectively. In the research of Wolf et al. (2005) the highest heritability shaping at the level from 0.30 to 0.37 depending on the breed and model used was estimated for the lean meat content. The heritability for average daily gains was relatively low and ranged from 0.13 to 0.18. The important direction for improving the performance test was searching for particular traits, which should characterize by a high heritability coefficients and were correlated with the meat content of animals (Klimas et al. 2004, Schinckel et al., 2001, Szyndler-Nędza et al. 2010 b).

The most important parameter of the performance test of pigs is the selection index determining the own utility of animals. The average value of the selection index of all tested young boars in 2009 shaped at the level of 114 points, however in 2010 amounted 113 points, thus slightly decreased (by 1.0 point). The highest its value had Hampshire animals, in 2009 – 128 points and in 2010 – 129 points. The differences between this group of animals and the remaining were confirmed at the level of significance $P \leq 0.01$. The next regarding to the selection index value in tested years i.e. 2009 and 2010 were young boars of Pietrain (121 points and 118 points), Duroc (119 points and 117 points), PLW (116 points and 115 points) and PL (112 points and 111 points). The differences concerning the selection index expressed in points in 2009 between the best 3 group i.e. Hampshire and the remaining breeds of pigs amounted from 7.0 (Pietrain, group 5) up to 16.0 (PL, group 2). Also in 2010 similar trends occurred, because the differences between young boars of Hampshire and another groups of animals were from 11.0 (Pietrain, group 5) up to 18.0 (PL, group 2). Comparing the results from 2009 and 2010 it may be observed that the selection index in pigs of Pietrain breed decreased by 3.0 points. In case of young boars of PLW, PL and Duroc, also decreased, but to a lower degree because only by 1.0, 1.0 and 2.0 points. It increased only in animals of Hampshire breed by 1.0 points (Tables 1 and 2).

The performance test selection index of pure breed young boars performance tested in 2009 towards the average value in the country was at higher level in Hampshire, Duroc and Pietrain animals, however at slightly lower level in PLW and PL (Eckert and Szyndler-Nędza 2010). In young boars performance tested in the Bydgoszcz Region in 2010 the value of this trait comparing to the average value in Poland was higher (similarly as in the previous year) in Hampshire, Duroc and Pietrain animals, comparable in PLW and lower in PL pigs (Eckert and Szyndler-Nędza 2011). It should be noted that in the previous own research (Michalska et al. 2006 a, 2010) it was observed, similarly as in the present paper, that within the space of 10 years (1995-2004) an effective improvement of Hampshire young boars has been done because the performance test selection index increased by 24.6 points. Also it should be emphasized that in range of the selection index, young boars of Hampshire breed

produced in The Bydgoszcz Breeding Region obtained in 2010 better results from the country average value by 19 points (Eckert and Szyndler-Nędza 2011).

Summarizing obtained results of research it should be stated that among pure breed young boars performance tested in The Bydgoszcz Breeding Region in years 2009 and 2010 animals of Hampshire breed had the highest growth rate. The Pietrain pigs had the highest meat content. Regarding to the most important parameter of performance test, i.e. selection index in analyzed years 2009 and 2010 the best results had young boars of Hampshire then Pietrain, Duroc, PLW and PL. Analyzing the results from the years 2009 and 2010 it was observed that a small increase of the performance test index value was only in case of Hampshire young boars (by 1.0 points). In case of the remaining groups of tested animals a slight decrease of the performance test index value has been observed.

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